BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XVII.] New York, September 6, 1890. [No. 9.

New or Little Known Grasses—II.*

By F. Lamson-Scribner.

(Plates CV–CVIII).

Some months ago I received from the Botanist of the United States Department of Agriculture specimens of a dicœcious grass—both the male and female plants—collected on the sandy coasts of Lower California, by Dr. E. Palmer. The characters presented by these specimens were in some respects remarkable and wholly unlike any species known to me. The characters of the female plants at once suggested those of *Jouvea straminea*, Fourn. (Bull. Soc. Roy. Bot. de Belgique, xv. p. 475) and a very careful further study of the material in hand has led me to the conclusion that this grass is none other than that rare species, which was unknown to Bentham and has never been seen by Prof. Hackel. While differing in some apparently essential points from the published descriptions of *Jouvea straminea*, there is such an agreement in the characters, especially in those which are most remarkable, that until we can make a comparison with the type, I must consider our plant certainly *Jouvea*, and in all probability *J. straminea*, which is diagnosed by Fournier (in Pl. Mex. ii. p. 68) as follows:

Jouvea. Gramen littoreum, junciforme. Spica terminalis, cylindrica acuta. Spiculæ unifloræ, dioicæ, in rhachide immerse et illi in parte inferiore adnatæ. Masculæ non notæ. Feminearum glumæ *duæ*, exterior cartilaginea, straminea, *interna hyalina*, apice tantum a rhachide distincta. *Paleæ duæ, augustæ minores;* stylus longus, stigmatibus 2, flore exeuntibus; *squamulis triangularibus.*

* For No. 1, see Bulletin, xv. 8–10.

F. straminea. Culmo striato, angusto, pedali, stramineo, glabro, nodis nigrescentibus, merithalliis 1-foliolatis; ligulis laciniatus pilosis, foliis linearibus, acutis, brevibus, pungentibus; spicis femineis 1–2, terminalibus cylindricis acutis; spiculis 1–3, alternis in rhachide immersis; gluma exteriore ab axe fissura tantum in parte superior discreta, *interior hyalina;* caryopsis immatura, in stylum *attenuata*, stigmatibus 2, plumosa, emergentibus.—In arena littoralis meris Pacifici, San Augustin (Lehm.).

Fournier saw only the pistillate plant and the specimens from which his description was drawn were evidently young, for he says: "caryopsis immatura." The specimens collected by Dr. Palmer are all very old and this difference in the state of the plants may account for some of the differences in the characters between our specimens and those described by Fournier. The points of disagreement in the above quoted description are in italics.

In our plants the outer glume in the ♀ spikelet is grown to the rhachis for four-fifths or five-sixths of its length. If it is understood that "in parte inferiore adnatæ," can only mean "adnate for half their length" or "their lower half adnate," we have a character not applicable to our plant; but does the expression demand a rendering which limits so definitely the extent of adnation? It is possible that in young plants the glumes are not so completely grown to the rhachis as in those which are mature.

In Palmer's specimens the limits of the adnate, cartilaginous outer glume are clearly visible in a transverse section of the spike made near the base of the spikelet and the cellular structure seems to indicate that it is seven-nerved. On the inner face and continuing entirely around the grain-cavity are several layers of dense sclerenchyma cells. Those cells which line the back of the cavity may belong to the "hyaline inner glume," but this glume cannot be distinguished excepting at the free apex, where it is grown by its edges to the outer glume, thus forming a short tube through which the rather stout style projects (fig. n, pl. CVI.)

I have been unable to find any traces of a flowering glume or palea. Fournier found both these organs, and although he mentions their shape and size, he says nothing of their texture. If they were very thin and hyaline, it is possible that they may have

become adnate to the mature grain and wholly undistinguishable. The outer layer of irregular, thin cells covering the grain, seen in transverse sections, may belong to these organs.

In all the characters excepting those here noted, and which we have tried to account for, our plant accords with *Jouvea straminea*, Fourn. The type specimens were collected on the sandy shores of the Pacific, within the same region as those gathered by Dr. Palmer, and although it is possible that two genera possessing such unusual characters might exist in that region, growing under like conditions, and have escaped the notice of botanists until now, it certainly does not seem probable, and considering that our plant agrees in so many and striking particulars with the published description of *Jouvea*, I think we ought to try to explain or harmonize any apparent differences rather than attempt to establish a new genus. Certainly it would be unwise to do this before we are assured of a valid distinction by a comparison with Fournier's types.

The characters of the genus *Jouvea*, based upon our specimens, are as follows:

JOUVEA, Fourn.

Spikelets unisexual, diœcious, very dissimilar, ♂ much compressed, many-flowered, spicate on slender terminal or lateral peduncles, rhachilla continuous. Empty glumes two, thin, the second one-nerved and larger than the first (in old specimens the empty glumes, particularly the first, are rarely present); flowering glumes longer and broader, carinate, acute herbaceo-chartaceous, three-nerved; palea broad and prominently two-keeled, stamens three. Female spikes one–several in terminal fascicles on the culm or its branches, enclosed below by the leaf-sheaths or broad prophylla terete, acute, articulated at base and falling off entire. Spikelets one-flowered, embedded in the continuous rhachis, adnate below. Outer glume cartilaginous, abruptly narrowed towards the free apex. Style single, long-exserted; stigmas two, plumose. Grain subterete, free.

Jouvea straminea, Fourn.? (*Rachidospermum Mexicanum*, Vasey, Bot. Gaz. xv. 110). Culms erect froma creeping rhizome, about 30 cm. high, striate, smooth, solid, the internodes flattened or sulcate upon alternating sides branched, the branches

erect and enveloped at the base by the short and somewhat dilated leaf-sheaths and strong prophylla, the latter being remarkably developed in aborted branches of the ♀ inflorescence. Lower sheaths crowded and over-lapping, those above much shorter than the internodes; ligule a ciliate fringe of short hairs, the hairs at the sides longer; leaves 1-10 cm. long, the uppermost shortest and divergent, all pungent-pointed, conduplicate, scabrous on the prominent striæ of the upper surface and a few scattering hairs near the margins. Staminate spikes 3-6 cm. long; spikelets three to six, sessile on alternate notches of the slender rhachis, 1½-3 cm. long, about 3 mm. wide, much compressed, ten- to eighteen-flowered. Flowering glumes 4-5 mm. long, broadly lanceolate, acute, with a strong keel, which is scabrous above, and a distinct lateral nerve on each side about half as long as the glume. Paleas somewhat shorter than the glumes, finely scabrous on the prominent keels. Female spikes 2-3 cm. long, somewhat concave on one side near the base, otherwise terete and very sharp-pointed, often a little curved and spur-shaped; spikelets one to three, alternate, 6-8 mm. long, deeply embedded in the rhachis to which the glumes are firmly adnate for four-fifths or five-sixths of their length. Style springing from one side of the top of the ovary, often bent back near the base and projecting through the conical-tubular apex of the glumes. Grain about 6 mm. long.

A portion of a ♀ spike of *Jouvea straminea*, Fourn.? showing the tubular free apex of the glumes, *a*.

I have referred this grass to *Jouvea straminea* with a query because Fournier's description, drawn as it was from an immature female plant, renders a positive identification from this alone, nearly impossible.

It appears* that the male and probably also female plants of this grass were collected at Cape St. Lucas, Lower California, by Xantus in 1859-'60. The first (No. 121 of the collection) was referred by Dr. Gray, in his account of Xantus' plants, to the present genus *Distichlis*. Of the probable female plant (No. 119) it is

*Botanical Gazette, xv. p. 109.

said "a new grass of uncertain genus, the single specimen mislaid." Very likely the male plant has been already published under *Brizopyrum* or *Distichlis*, to which genus it bears a general resemblance, but from which it differs markedly in its solid culms, its manner of branching, sessile spikelets and three-nerved flowering glumes. Fournier, who knew only the female plant, allied *Jouvea* with *Buchloë*, and Bentham followed him in Genera Plantarum (vol. iii. p. 1173). The genus has, however, no affinities with the Chlorideæ. Judging from the characters of the female spikes, as given by Fournier, Prof. Hackel (in Engl. und Prantl, Nat. Pflanzenfam. 2, vol. ii. pp. 76, 78; the "True Grasses," pp. 170-174) placed *Jouvea* near *Monerma* and *Ischnurus* in Hordeæ. Although the position here assigned is, to me, unsatisfactory, I am unable to find another where the peculiar characters of the grass will render the relationship less questionable. As the tribes of the family are defined by Bentham and by Hackel our grass would certainly fall under Hordeæ, and would not fall under any of the others excepting the characters of these be modified. If properly referred, it is remarkable as being the only diœcious grass among the Hordeæ.

PENTARRHAPHIS FOURNIERANA, Hack. & Scribn.

Among the plants collected by Mr. C. G. Pringle in Guadalajara, Mexico, in 1889, there is a grass which in a recent collection from the same region (Palmer No. 200, 1886) was referred to *Bouteloua*, (*B. Fourierana*, Vasey, Proc. Amer. Acad. xxii. 461, without description) but from which genus it differs in several essential characters. I sent samples of this grass, along with some others of Pringle's collection, to Prof. Hackel, and in referring to the lot Hackel says: "There are several very interesting species in it, and above all there is what I believe to be the long-forgotten and doubtful genus *Pentarrhaphis* of Kunth, represented by Pringle's No. 2559. It does not match fully the species described by Kunth in Humb. Bonpl. Nov. Gen. et. Spec. i. p. 178, t. 60, viz. *P. scabra*, but differs in several points, chiefly in having *two* spikelets on each node of the rhachis instead of one, and in the smaller number of setæ at the base of the twin spikelets. These setæ, which Kunth believed to be the teeth of a supposed "gluma steri-

lis inferior," are in my view, the relics of a whole rudimentary spikelet. You will often have observed in several Bouteloueæ (the genus to which *Pentarrhaphis* is very nearly allied) that the rhachilla of the spikelet is headed by a group of bristles (in *B. multiseta*, for example, by many) which are reduced glumes. Now in *Pentarrhaphis* I believe the group of bristles at the base represents a whole rudimentary spikelet. The number of these setæ seems to be somewhat variable, as is often the case with rudimentary organs. As you have fuller materials for investigation I invite you to make a closer study of it, and should you gain the same opinion as myself regarding it, I propose for the species the name *Pentarrhaphis geminata*, Hack. & Scribn.

"I believe that *Polyschistis*, Presl. (in Rel. Hænk. i. p. 294) is quite the same genus, and his *P. paupercula* seems even to be very nearly allied to *Pentarrhaphis geminata*. But I can only judge of this from Presl's figure, not from authentic specimens, which I sought for in vain in the Vienna Herbarium. Presl says that Hænke collected it in Luzone, but he very often confounded plants from Mexico with those from the Philippines, and *vice versa*."

After making a careful investigation of the spikelets and the bristles or setæ accompanying them, I communicated my conclusions, detailed below, to Prof. Hackel, and in reply he says: "I fully agree with you in the signification that you give to the various bristles that accompany the base of the twin spikelets. As to the number of five bristles, described by Kunth, I venture the view that one of them was the outer glume, the rest forming two pairs, each representing a sterile spikelet. I found also in your specimen one example of a single spikelet [in the cluster] and I think it was accompanied by five or six bristles."

I found several such examples as here referred to, in my specimens, always the lowermost clusters in the racemes. Fig. B, Plate CVIII illustrates one of these. At the base of this spikelet on the upper or outer side, is the second empty glume, *a*, while on the lower or inner side are several strongly pilose setæ (three of which are undistinguishable from one another when dry, the fourth being evidently the second spikelet very imperfectly developed. From the position of these setæ they might easily be mistaken for a quadripartite lower glume, such as Presl describes for *Poly-*

schistis, "gluma inferiora quadripartita, flora brevior, laciniis lineari-subulatis, pilosis." Supposing one of these bristles to have been bifid, as at *c*, plate CVII, only more deeply so, there would then exist a striking resemblance to the lower glume of *Pentarrhaphis*, as described by Kunth: "gluma inferior ex aristis quinque basi subconnatis composita."

In the clusters or fascicles with two well developed spikelets these spring from a very much shortened, hirsute axis so that they appear to stand opposite each other, the backs of their lowest glumes coming together, see figure A, plate CVIII. Between the spikelets are three setæ or awn-like bristles, one of which is often more or less deeply two-parted. These bristles, shown more clearly in figure C, are sub-equal in length, similarly pilose and projecting in the same line of growth with the spikelets, and appear to be, at least when examined dry, all of the same nature. If moistened, however, and then carefully examined under a lense, two of them will be found to have upon each side below a narrow membranous margin (see figs. *b'*, *b'*, plate CVII); this character, together with that of their position, determines them to be the lower empty glumes of the two spikelets. The third seta is either simple or bifid and originates at a point a little to one side or in advance of the lower empty glumes. It may be said to occupy the centre of the fascicle of which it forms a part, representing the rudiment of a third spikelet. That it is not a continuation of the partial rhachis, but really the representative of a third spikelet, is determined, I think, by the following characters: (1) its direction of growth in the same line with the fully developed spikelets; (2) its springing from the same very hirsute and condensed axis of these spikelets, which is (to me an important point in this connection) articulated with the short pedicel from the main rhachis; (3) its being pilose like the empty glumes, the extended midribs or awns of which it most closely resembles. In those Bouteloueæ with which I am familiar, wherein the rhachis of the spikes is produced beyond the spikes, the primary direction of this rhachis is continued, and although it may be reduced to a sharp point or even become notched or bifid as in *Bouteloua disticha*, Benth. (*Polyodon distichum*, HBK.) there is no question as to its true character.

Assuming that the foregoing views respecting the nature of the setæ at the base of the single spikelet or pair of spikelets, to be correct, the genus *Pentarrhaphis*, placed among those regarded as doubtful by Bentham (Gen. Pl. iii. p. 1090) and founded upon a single Mexican species which has been completely lost to recent botanists, may be characterized as follows:

PENTARRHAPHIS HBK. Nov. Gen. et Spec. i. p. 177, t. 60. (*Polyschistis* Presl, Rel. Haenk. i. 294, t. 41).

Tribe Chlorideæ.

Spikelets one to two in each fascicle-like spike, accompanied by one to four shorter, awn-like rudiments, two-flowered, the first flower ♀, the second ♀ or ♂; rhachilla produced into a short simple bristle behind the palea of the second floret. Empty glumes two, one-nerved, the first very narrow, awn-like when dry, the second somewhat longer, lanceolate, usually two-toothed, awned between the teeth; flowering glumes five or seven-toothed, the middle and marginal teeth extending into a long, divergent, scabrous awn. Palea strongly two-nerved, two-toothed or sometimes briefly two-awned. Stamens three; styles distinct. Stigmas projecting from the sides of the florets, penicilliform. Lodicules two, dolabriform. Grain oblong, free. Low, slender, tufted grasses with erect, simple or branched flowering culms and narrow flat leaves. Spikes very short, secund and rather remote along the flexuose and sometimes arcuate rhachis, articulated with the very short pedicels and falling off entire.

The disposition and appearance of the clusters of spikelets and also their deciduous character are the same as in *Ægopogon*; their external resemblance to *Melanocenchris*, with which this genus is very closely allied, is even more marked. In the first, however, the separate spikelets are one-flowered and pedicellate in the clusters; in the second, the spikelets are one-flowered, above which the rhachilla bears several empty bracts similar to the flowering glume. From *Bouteloua*, section Triathera, *Pentarrhaphis* may readily be distinguished by its two-flowered spikelets and simple, bristle-like prolongation of the rhachilla.—Species three, two certainly and probably also the third, Mexican.

P. FOURNIERANA, Hack. and Scribn. Culms densely crowded

along a creeping rhizome forming a thick, dense turf, erect, 18 to 25 cm. high; nodes silky villous with erect hairs; sheaths very slightly inflated, sparsely pilose and hairy at the throat; ligule a ring of short hairs; leaves about 1 mm. wide, pilose, especially the longer ones from the base, upper leaves 1½ to 3 cm. long, all very acute; spikes three to six, secund-racemose along the somewhat compressed rhachis. Spikelets two in each cluster with a single, simple or bifid, awn-like rudiment of a third, sessile. Empty glumes pilose with rather long, stiff hairs, hirsute at the base, much shorter than the spikelets; flowering glumes densely hairy at the base and more or less pilose along their margins.—Mexico, (Pringle, No. 2,559, 1889; Palmer, 200, 1886).

Pentarrhaphis scabra, HBK., has taller, and branched flowering culms, longer and broader leaves, one spikelet only at each node of the main rhachis, and the lower empty glume and the bristle-like rudiments (according to the illustration in Nov. Gen. et Spec.) are simply scabrous (see fig. *w*, plate CVIII).

In *Pentarrhaphis paupercula*, (*Polyschistis paupercula*, Presl), the lower leaves are short, like the upper ones, spikelets single at the nodes of main rhachis, and short pedicel of the second floret (joint of the rhachilla) pilose. (See figs. x and x′, plate CVIII). According to Presl this species is annual. The descriptions and illustrations of these species given by Kunth and Presl permit of the following brief synopsis of them.

Spikelets two in each cluster, rudiment a single simple or bifid, pilose bristle.....1. P. FOURNIERANA.
Spikelets one in each cluster, rudimentary bristles three or four.
Bristles and pedicel of the second floret scabrous...2. P. SCABRA.
Bristles and pedicel of the second floret pilose.....3. P. PAUPERCULA.

EXPLANATION OF PLATES.

Plate CV.

Male and female plants of *Jouvea straminea*, Fourn.? reduced in size.

Plate CVI.

a.—A portion of the ♀ inflorescence.

b.—A one-flowered ♀ spike, enclosed at the base by a leaf.

c.—A similar spike with the leaf removed, showing prophylla, x.
d.—A two-flowered ♀ spike.
e.—A similar spike, the lower portion in longitudinal section, showing grain cavities.
f.—A section of the lower part of a ♀ spike, made in the same plane as the glume, showing grain, etc.
g.—Grain with a portion of the style.
h, *i*, *k*.—Transverse sections of the spike across a spikelet, showing the grain within.
l, *m*.—Transverse sections of the grain, *l*, includes the embryo.
n.—Free apex of the glumes.
o.—Staminate spikelet.
p.—Floret of same.
r.—Flowering glume of ♂ floret expanded.
s.—A stamen.
t.—A portion of the stem and a branch with a prophyllum, x.
u.—Transverse section of the culm.
v.—Transverse section of a leaf.
w.—Figure showing the ligule.

Plate CVII.

H.—A plant of *Pentarrhaphis Fournieriana*, somewhat reduced.
b', *b'*.—First empty glumes of the two spikelets, moistened and membranous margins pressed out.
a.—Second empty glume.
f l.—Flowering glume of the first floret.
P.—Palea of same.
c.—Bifid rudiment of the third spikelet.
K.—Pistil with lodicules with scale of enlargement indicated.
L.—Lodicules spread out.

Plate CVIII.

A.—Spike or cluster of spikelets with portion of main rhachis, r.
C.—Cluster of spikelets spread apart to expose the bristle-like lower glumes, *b*, *b*, and bifid rudiment, *c*.
B.—Cluster of spikelets in which the second spikelet is reduced nearly to the form of the bristles.
e.—Anterior view of the pedicellate second floret, showing the prolongation of the rhachilla, f.
w.—Cluster of spikelets of *Pentarrhaphis scabra*, the florets separated from the empty glumes and bristles.
v.—First floret of same.
u.—Second floret of same, showlng prolongation of rhachilla, f'.
X.—Cluster of spikelets of *Pentarrhaphis paupercula* (*Polyschistis paupercula*, Presl).
X'.—Second floret of same, showing the pilose pedicel.

All of plates CV, CVI and CVII, and figures A, B, C and *e* of plate CVIII original. Figures *u*, *v* and *w*, redrawn from Kunth; figures X and X', redrawn from Presl.

Proceedings of the Botanical Club of the A. A. A. S., Indianapolis Meeting, August, 1890.

THURSDAY, AUGUST 21st.

The President, Dr. N. L. Britton, in the chair, Dr. C. R. Barnes, Secretary.

Dr. Britton spoke on "The Present State of Systematic Botany in North America," alluding to the great amount of investigation now being done at the several centers of work, the increasing number of specialists and the general satisfactory condition of the science.

Mr. Fernow remarked on his new check-list of North American trees, the nomenclature based for the most part on the recent writings of Professor Sargent and compiled by Mr. Sudworth. The list will give both scientific and common names; in the compilation of the latter he asked the assistance of botanists all over the country.

Mr. C. M. Weed exhibited specimens of *Actinella acaulis* from Lakeside, Ohio, where it appears to be native. This greatly extends the range of the plant to the East. Professor Bessey stated that it occurred in Nebraska on hill-tops.

Mr. Weed also read a paper on "The Milky Juices of Plants as a Protection against Insect Borers." He had found this hold true in many plants, but *Lactuca Canadensis* seemed to be an exception. Professor Burrill said that the same fact had been reported to him from Greece in the case of the fig, *Ficus Indica*, the plant being artificially slashed to prevent insect depredations.

Professor Beal described small tubers detected by him on the roots of *Ceanothus Americanus*. Professor Burrill remarked that it would be interesting if these should prove to have the same functions attributed to the tubercles borne so abundantly in the Leguminosæ. Dr. Britton called attention to an observation by Dr. Thurber on the occurrence of tubers on *Rhexia*.

Professor Burrill remarked on the genus *Bacterium*, maintaining that it should be recognized as valid.

FRIDAY, AUG. 22.

Mr. B. D. Galloway presented a paper by Miss Effie A.

Southworth on "A New Hollyhock Disease," caused by the hitherto undescribed fungus *Colletotrichium Althææ*.

Professor Scribner remarked on "The Nature of the Palea and Lodicules in Grasses."

The conclusions drawn were:

1. That the palea are two-keeled prophylla which begin the floral branch, and like those of the culm-branches, stand with their backs toward the main axis or rhachilla of the spikelet; when the flower is carried back on to the rhachilla the palea is wanting.

2. The lodicules are true scales, in that they belong to the epidermal system, and their sole function is to separate the glumes in anthesis, as the special epidermal development in the axils of the panicle-branches serves to diverge these during the same period by pressing against the axis from which the branches arise.

Professor Lazenby called attention to two marked forms of the Virginia Creeper, *Vitis* (*Ampelopsis*) *quinquefolia*, one of which clings readily to houses and other structures, while the other does not. The clinging one appears to be native in Indiana and Ohio, while the other is there only found in cultivation. Remarks were made by Professors Beal, Bastin and Claypole.

Prof. L. H. Pammel read a paper on "Pollination of the Genus *Æsculus*."

Professor Campbell remarked on "Adventive Buds of *Lycopodium lucidulum*," on "The Archegonia of Ferns," and on "The Germination of the Spores and the Prothallia of *Osmunda*."

The President appointed as a Committee on Nominations of Officers for the next meeting, Professor Wilson, Mr. Coville and Professor Spaulding.

Monday, August 25th.

Mr. F. V. Coville remarked on his descriptive list of the *Juncí* of Texas; it includes seventeen species, one of which is Texan only, (*J. filipendulus*), fourteen range to the northeast and two are found in the Rocky Mountains. Mr. Coville also exhibited a serviceable collecting knife, the "cotton knife" of the South, which he especially recommended for the collection of subterra-

nean parts of plants. Professor Beal spoke of the importance of the root-stocks of grasses as diagnostic characters, and remarked on their poor representation in herbaria.

Professor Arthur described several pieces of apparatus for the investigation of phenomena of vegetable physiology, illustrated by drawings. The subject was discussed by Professor McBride, Mr. W. H. Seaman, Professor Bessey and Professor Spaulding.

Mr. Coville reported on the progress of the Botanical Exchange Club under the direction of the Division of Botany of the United States Department of Agriculture, stating that some five thousand specimens are now in hand.

Professor Claypole read a paper on "Plant Colonists at Akron, Ohio," alluding to *Conium maculatum, Tragopogon porrifolius, Artemisia vulgaris* and *Cnicus arvensis*, both sterile and fertile plants of the latter being found, and *Lactuca Scariola*. Professor Burrill remarked on the scarcity of fertile plants of *Cnicus arvensis* in Illinois, and Dr. Britton stated that they were also rare in New Jersey and Southern New York. Professor Arthur reported that *Dysodia chrysanthemoides* and *Iva xanthiifolia* were steadily migrating eastward along the railroads. Dr. Britton reported *Leontodon hirtus* as recently found at several points in New Jersey and New York, and *Crepis pulchra* introduced along the railroad at Culpepper, Virginia. Both of these European species demand admission into our text-books of systematic botany. Mr. Blatchley stated that *Solanum rostratum* had been found in Indiana, an immigrant from the southwest. Fugitive specimens of the latter have also been picked up in New York and New Jersey.

In the afternoon the club enjoyed an excursion tendered by the Local Committee of Arrangements, to a series of ravines known as the "Shades of Death," situated about fifty miles from Indianapolis, and reached by the I., D. & W. R. R., which generously provided a special train for the transportation of the members. Despite the somewhat forbidding name of the locality it proved to be of much botanical interest, and a delightful trip was experienced. At an informal meeting on the grounds, the President appointed Professors Bastin, Wilson and Bessey a committee to draw suitable resolutions of thanks to the local committee and the superintendent of the I., D. and W. R. R.

TUESDAY, AUG. 26th.

Professor Halsted reported a double-flowered form of *Convolvulus sepium*, and a probable hybrid of *Tragopogon pratensis* × *T. porrifolius* from New Brunswick, N. J. He also stated that the pollen of *Epilobium palustre* var. *oliganthum* is interestingly different from that of any other species of the genus in having the four grains produced in each mother cell, remain united in a quadrate mass and are only separated by prolonged teasing. The individual grains are large, as they noticeably are in the genus, and the groups are therefore remarkably conspicuous. When taken from the stigma they usually exhibit tubes proceeding one from each of the four grains. That the plant common and that the quadrate pollen masses make fine objects for the microscope are the excuses for mentioning the peculiarity not often met with elsewhere. In this species it seems to be constant. In the absence of Prof. Halsted his communications were presented by the Secretary.

Professor McBride stated that he thought other species of *Epilobium* shared the same structure.

A paper by Miss E. Porter—"Notes on Spore Discharge of Ascomycetes," was read by the Secretary. It contained observations on this process in species of *Pleospora*.

Mr. H. L. Bolley read a paper on "Potatoe Scab a Bacterial Disease," illustrated by specimens and drawings. Prof. Burrill stated that the investigation conducted by Mr. Bolley would lead to some of the most valuable results reached for many years in the study of vegetable pathology.

The committee appointed to nominate officers for the next meeting of the club reported as follows:

President, Mr. Wm. M. Canby, of Wilmington, Del.

Vice-President, Prof. Lucien M. Underwood, of Syracuse, N. Y.

Secretary, Mr. B. D. Galloway, of Washington, D. C.

The nominees were unanimously elected.

The President then declared the club adjourned, to meet next year at Washington, D. C.

List of Botanical Papers Presented before the Section of Biology, Indianapolis Meeting A. A. A. S., August, 1890.

Forest Trees of Indiana, by Stanley Coulter.

Preliminary notes on a new and destructive Oat Disease, by B. T. Galloway.

Observations on the variability of disease-germs, by Theobald Smith.

The Trimorphism of *Uromyces Trifolii*, by J. K. Howell, presented by W. R. Dudley.

Observations on the life history of *Uncinula spiralis*, by B. T. Galloway.

On the seed coats of the genus *Euphorbia*, by L. H. Pammel.

Observations on the method of growth of the Prothallia of the Filicineæ, with reference to their relationships, by Douglas H. Campbell.

Development of the Sporocarp of *Griffithsia Bornetiana*, by V. M. Spalding.

Contributions to the life history of *Isoetes*, by Douglas H. Campbell.

The relation of the Mexican flora to that of the United States, by Sereno Watson.

The distribution of the North American *Umbelliferæ*, by John M. Coulter.

The distribution of Hepaticæ of North America, by Lucien M. Underwood.

The Migration of Weeds, by Byron D. Halsted.

Geographical distribution of North American Grasses, by W. J. Beal.

Geographical distribution of North American Cornaceæ, by John M. Coulter.

The general distribution of North American plants, by N. L. Britton.

Work of the Botanical Division of the Department of Agriculture, by F. V. Coville.

The continuity of protoplasm through the cell-walls of plants, by W. J. Beal and T. W. Tuomey.

The development and function of the so-called Cypress-"knees," with a consideration of the natural habitat of the tree, by W. P. Wilson.

Preliminary notes on the genus *Rynchospora* in North America, by N. L. Britton.

On *Rusbya*, a new genus of Vacciniaceæ from Bolivia, by N. L. Britton.

Notes on a monograph of the genus *Lechea*, by N. L. Britton.

The specific germ of the Carnation disease, by J. C. Arthur and H. L. Bolley.

Notes upon plants collected by Dr. Ed. Palmer at La Paz, Lower California, in 1890, by J. N. Rose, presented by John M. Coulter.

Notes upon the crystals in certain species of the Arum family, by W. R. Lazenby.

Notes on *Isopyrum biternatum*, by C. W. Hargitt.

Botanical Notes.

Tubular Flowers in Rudbeckia. I have lately had handed to me a flower of the *Rudbeckia hirta*, in which the rays instead of being flat are all tubular. The plant grows here in Concord, it had eight or ten flowers and all the rays were like the specimen given me. The tubular flowers were of the light color of the underside of the rays, while the opening at the end was bright yellow, a line or vein being on the centre of the upper side where the rolled rays seemed to join. The flower looked very much like the hub and spokes of a wheel. A. W. HOSMER.

Concord, Mass.

Progress at Brown University. Botany is looking up at Brown University. At its last meeting, the Corporation elected Mr. James L. Bennett Curator of the Herbaria, and Prof. H. C. Bumpus assistant in Biology. We have some hopes, too, of new and better accommodations for the herbaria and laboratory. We greatly desire to strengthen our present collections and to create an economic museum. In the hope that some friend may see this and aid us, I send you this brief note. Fruits, fibres, fabrics, drugs; nothing vegetable will be alien to us. We ask the good will of the fraternity. W. W. BAILEY.

Reviews of Foreign Literature.

Conspectus Floræ Europaeæ. Supplementum II, Pars altera. C. F. Nyman. (8vo., pp. 225-404, Orebro, 1890).

This concluding part of a most extensive and important piece of work includes additions and emendations to the preceding pages, notes, observations and a complete index to the Supplement. It embraces the additional matter from Borragineæ to Pteridophyta. A very considerable number of species have been added to the Flora of Europe since the completion of the Conspectus. Localities for rare or critical species are cited in detail, and references given for descriptions of all the additional species. It would have been exceedingly interesting to have had a statement of the number of species recognized in the work, in order to compare it with those known from an equal area of America lying in the same latitudes.

Monographie der Gattung Orobanche. Dr. Gunther Ritter Beck von Mannagetta. (Bibliotheca Botanica, Heft 19).

This is an exhaustive monograph of these interesting root-parasites, including chapters on the history of the genus, its morphology, anatomy and physiology, the host-plants of the various species and their geographical distribution. Then follows the critical description of the eighty-three species recognized, nine of which are American, included in the subgenera Aphyllon, Myzorrhiza and Kopsiopsis. The first of these includes (1) *O. uniflora*, L. (*A. uniflorum*, Gray) and (2) *O. fasciculata* (Spreng.) Nutt. (*A. fasciculatum*, T. & G. The second (3) *O. Californica*, C. & S. (*A. Californicum*, Gray); (4) *O. Grayana*, Beck (*A. comosum*, Gray; *O. comosa*, Hook. not Wallr.); (5) *O. Ludoviciana*, Nutt. (*A. Ludoviciana*, Gray) and under this *A. Cooperi*, Gray and *A. multiflora*, Nutt. are placed as varieties; (6) *O. Chilensis* (Phil.), Beck, the only South American species; (7) *O. bulbosa*, Beck (*A. tuberosum*, Gray, not *O. tuberosa*, Hook); (8) *O. pinorum*, Geyer (*A. pinetorum*, Gray) which Dr. Beck has not seen and regards as imperfectly described. The third subgenus includes (9) *O. Hookeri*, Beck, (*Boschniakia strobilacea*, Gray).

N. L. B.

Recherches expérimentales sur les Modifications des Feuilles chez

les Plantes maritimes; par M. Pierre Lesage (Revue Génér. de Bot. Fev., Mars, April, '90).

This paper sets forth elaborate experiments on the variations of inland plants grown at the seashore. Ninety species taken from thirty-two orders were studied and three plants especially were cultivated, *Pisum sativum*, *Linum grandiflorum* and *Lepidium sativum*. The stated results of the experiments are here translated as closely as possible.

1st. Plants growing by the sea generally have thicker leaves than when they grow inland. All plants naturally do not follow this rule.

2d. In plants that most successfully submit to maritime influence, the palisade-cells are much developed. If the thickness of the leaf has notably increased, the palisades are much lengthened, at the same time the number of the mesophyll layers may augment or remain the same, according to the species. If the leaf keeps to more or less the same thickness in the different cases, the palisades are developed so that the relation of the palisadic tissue to the mesophyll is greatest at the seashore.

3d. The lacunæ are greatly reduced in plants of the seaboard.

4th. Chlorophyll tends to be less abundant in the cells of plants on the shore. This conclusion is less rigorous than the preceding ones. It cannot be verified well, except in plants stationed where they can be more or less inundated by the sea or where they can receive the salt mist from the waves in large quantities.

5th. The carnosity, the development of the palisades, the reduction of the lacunæ and the diminution of the chlorophyll can be obtained in experimental cultivation, where the variable element is salt. A. M. V.

Index to Recent American Botanical Literature.

Æsculus Parryi. C. S. S. (Garden & Forest, iii. 356, Fig. 47).

Apical growth in Roots of Marsilia quadrifolia and Equisetum arvense. Wm. M. Andrews (Bot. Gaz. xv. 174-177, illustrated).

Chestnut Tree—The. (Garden & Forest, iii. 353, 354, illustrated).

Clematis Fremontii. (Garden & Forest, iii. 380, fig. 49).

Cornaceæ—A Revision of North American. J. M. Coulter and W. H. Evans. (Bot. Gaz. xv. 30–38, 86–97 ; also reprinted).

In this revision the authors lay considerable stress upon the characters of the stones of the fruit as points of distinction, not only between species, but also between sections, in their arrangement of the genus *Cornus*. *C. Drummondii*, C. A. Meyer, is relegated to a variety of *C. asperifolia*, Michx. *C. Californica*, C. A. Meyer, is considered to be a variety of *C. pubescens*, Nutt. *C. candidissima*, Marsh. (1785), replaces *C. paniculata*, L'Her., (1788). *C. Greenei* is described as a new species founded on specimens furnished by Prof. E. L. Greene, from California. *C. Baileyi* is also named as a new species, from specimens collected about the Great Lakes and westward. The same species was distributed by Dr. Porter as *C. pubescens*, and has been confused with several other species. In regard to these the authors say: "*C. stolonifera*, *C. Baileyi* and *C. pubescens* form a very perplexing and apparently confluent group of species. In all probability they freely cross with one another, and some of the puzzling intermediate forms may be hybrids." The genus *Nyssa* is also arranged according to the characteristics of the fruit and their stones. Only four species are recognized.

Under the genus *Garrya*, *G. Lindheimeri*, Torr. becomes *G. ovata*, Benth. var. *Lindheimeri ; G. flavescens*, Watson, becomes *G. Veatchii*, Kellogg, var. *flavescens* and *G. flavescens*, var. *Palmeri*, Watson, becomes *G. Veatchii*, Kellogg. A. H.

Fungi in the Collection of the Association—List of Staten Island. Arthur Hollick & N. L. Britton. (Proc. Nat. Sci. Assn. S. I. Special No. 11, Aug., 1890).

This list of forty-two species of fungi was prepared from specimens collected on Staten Island by the members of the Natural Science Association and submitted to Mr. J. B. Ellis for determination. As might be expected, the species are such as are more or less conspicuous—thirteen of them being in the genus *Polyporus*. In regard to *P. rimosus*, Berk., Mr. Ellis says, in a foot-note: "Your specimen is the first I have seen from this region."

Goanese Ipecac. H. H. Rusby. (Reprint from Drug. Bull., July, 1890, illustrated).

Under this title is a description and plate of *Naregamia alata*, W. & A.

History of Garden Vegetables. E. L. Sturtevant. (Am. Nat. xxiv. 629-646).

This contribution to the subject contains notes on "Rocket Salad," (*Brassica eruca*); "Rosemary," (*Rosemarinus officinalis*); "Rue," (*Ruta graveoleus*); "Ruta-baga," (*Brassica Napobrassica*); "Saffron," (*Crocus sativus*); "Sage," (*Salvia officinalis.*); "Salsify," (*Tragopogon porrifolius*); "Samphire," *Crithmum maritimum*); "Savory" (*Satureja* sp.); Savoy Cabbage, (*Brassica oleracea bullata*); Scarlet Runner Bean, (*Phascolus multiflorus*); Scolymus, (*Scolymus Hispanicus*); Scorzonera (*Scorzonera Hispanica*); "Scurvy Grass," (*Cochlearia officinalis*, "Sea Kale," (*Crambe maritima*) and "Shallot," (*Allium ascalonicum*).

List of Plants collected by Dr. Edward Palmer, in 1888, *in Southern California.* Geo. Vasey and J. N. Rose (Contr. Nat. Herb., No. 1., 1-8).

An enumeration of two hundred and forty-seven species, many of them rare. No new species are described.

List of Plants collected by Dr. Edward Palmer, in 1889, *at Lagoon Head, Cedros Island, San Benito Island, Guadalupe Island and at the Head of the Gulf of California.* Geo. Vasey and J. N. Rose. (Contrib. Nat. Herb., No. 1, 9-28).

An enumeration of several hundred species including descriptions by Mr. Rose of new ones in the genera *Sisymbrium, Encelia, Phacelia, Nicotiana, Eschscholtzia, Sphæralcea* and *Hemizonia*, and *Euphorhia Pondii*, Millspaugh.

Mosses of Staten Island—Preliminary list of the. E. G. Britton. (Proc. Nat. Sci. Assn. S. I., Special No. 10, July, 1890).

In this list are enumerated five species and varieties of Sphagna and ninety-six Musci. In a brief head-note the author says that the specimens upon which the list is founded were collected during a period of about eight years, and it is to be considered as very nearly complete, but additions may be looked for in the genera *Bryum, Barbula* and *Orthotrichum.*

Native Shrubs of California—IV. E. L. Greene. (Garden and Forest, iii. 378, 379).

Interesting memoranda upon four species of *Lavatera* are given under this heading, the first one of which, (*L. assurgentiflora*), is the only species inhabiting the main land. Of the other three each one inhabits an island of its own off the coast of Lower California. *L. venosa* is confined to the island of San Benito, *L. insularis* to Coronado Island and *L. occidentalis* to Guadalupe.

Notes on North American Trees.—XX. C. S. Sargent. (Garden and Forest, iii. 355–356).

Description of the wood of the following species are given: *Terminalia Buceras, Quercus tomentella, Cupressus MacNabiana, Picea Breweriana* and *Larix Lyallii.*

Osservazioni sulla Mina lobata. G. E. Mattei. (Nuevo Giorn. Bot. Ital. xxii. 290).

Pitcher Plants. Sophie B. Herrick. (The Great Divide, iii. 74, 75).

The editors of the "Great Divide" are evidently not botanists, or else they presume upon not having botanists on their list of subscribers, otherwise this extraordinary article could certainly not have appeared. The text is written in the usual style of a popular treatise and contains but little information that is deceptive. In the illustrations, however, a *Cephalotus* is boldly called *Sarracenia variolaris*, a *Nepenthes* is labelled *Darlingtonia Californica*, and a *Darlingtonia* is named *Sarracenia purpurea.* There is also a figure of *Utricularia* which, as the name is suggested, might be recognized for a member of that genus.

Plant Diseases—On the Nature of Certain. A. L. Kean. (Bot. Gaz. xv. 171–174).

Plant Notes. E. J. Hill. (Garden and Forest, iii. 370).

Memoranda upon *Hypericum Kalmianum* and *Lobelia Kalmii.*

Ramularia on Cotton—A New. Geo. F. Atkinson. (Bot. Gaz. xv. 166–168, illustrated).

Ramularia areola is described and figured as new.

Schubertia grandiflora, Mart. and Zucc. S. W. (Garden and Forest, iii. 368, fig. 48).

Tecoma radicans. W. Goldring. (Garden, xxxviii. 51, illustrated).

Upon a Collection of Plants made by Mr. G. C. Nealley in the region of the Rio Grande in Texas, from Brazos Santiago to El Paso County. John M. Coulter. (Contrib. Nat. Herb. No. 2, pp. 65, Washington, 1890).

Mr. Nealley has been employed by Dr. Vasey for several years in the collection of the plants of southwestern Texas. He has succeeded in finding many of the rarer species, not obtained since the time of the Mexican Boundary Survey, and in addition to this has discovered a considerable number of undescribed species. Among the most interesting of the plants enumerated by Professor Coulter, are *Castalia elegans*, found in considerable abundance in a new locality. *Castalia flava*, to which is doubtfully referred all the Texano-Mexican yellow water-lily specimens, including Bourgeau's No. 4, from Santa Anita, and Pringle's No. 1,956, from Brownsville, distributed as *Nymphæa Mexicana; Thelypodium Vaseyi*, n. sp., *Abutilon Nealleyi*, n. sp., *Sphæralcea subhastata*, n. sp., *Cardiospermum molle*, and *Desmodium spirale*, new to the United States, *Pithecolobium Texense*, n. sp., *Gaura Nealleyi*, n. sp., *Turnera diffusa*, var. *aphrodisiaca*, new to the United States, *Aplopappus Nealleyi* and *A. Texense*, n. sp., *Viguiera longipes*, n. sp., *Perityle Vaseyi*, n. sp., *Ipomœa Nealleyi*, and *I. Texana*, n. sp., *Eriogonum Nealleyi*, n. sp. and *Euphorbia Vaseyi*, n. sp. The Juncaceæ and Cyperaceæ, named by Mr. Coville, include several species heretofore only sparingly collected. Dr. Vasey enumerates the Gramineæ and describes the following new species: *Panicum capillarioides*, *Muhlenbergia Lemmoni*, Scribn., *Sporobolus Nealleyi* and *S. Texanus; Trisetum Hallii*, Scribn., *Bouteloua breviseta*, *Triodia eragrostoides*, Vasey and Scribn.; *T. grandiflora* and *Poa Texana*. The Pteridophyta were named by Mr. Henry E. Seaton, *Notholæna Nealleyi*, being described as new.

Altogether this is the most valuable and interesting collection recently made in the United States, and a very satisfactory result of the work of the Division of Botany in exploration. The original specific names of the plants enumerated, have been retained in many instances. We wish that this had been uniformly carried out, and the parenthetic citation of authors employed.

N. L. B.